

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): An IGBT with a monolithically integrated antiparallel diode, comprising:

a semiconductor substrate forming an inner zone and having a front side, a rear side, and a peripheral annular high-voltage edge;

said front side of said semiconductor substrate having semiconductor wells of a first conductivity type formed therein with transistor cells within said peripheral annular high-voltage edge, said peripheral annular high-voltage edge being provided on said front side of said semiconductor substrate;

at least one emitter region of the first conductivity type formed at said rear side of said semiconductor substrate;

at least one emitter short region of a second conductivity type integrated substantially only in a region of said high-voltage edge, said at least one emitter short region lying in a plane with said at least one emitter region and forming an electrode of the antiparallel diode, said at least one emitter

Applc. No. 10/698,082
Response Dated May 17, 2006
Responsive to Office Action of March 24, 2006

short region extending as far as a chip end in edge regions of the IGBT;

) said at least one emitter region having no emitter short regions within said high-voltage edge;

said at least one emitter region having a thickness of less than 1 micrometer and a doping with a dose of between $1 \cdot 10^{12}$ and $1 \cdot 10^{15}$ charge carriers per cm^3 ;

said semiconductor wells on said front side of said semiconductor substrate forming a counterelectrode of the antiparallel diode; and

a distance between a point located at the center of the IGBT and said at least one emitter short region being maximized for triggering the IGBT at a lowest possible current.

Claim 2 (original): The IGBT according to claim 1, wherein said semiconductor wells at least predominantly contain transistor cells.

Claim 3 (canceled)

)

05-17-'06 10:52 FROM-LGS PatentUSA

+9549251101

T-238 P04/12 U-911

Applic. No. 10/698,082
Response Dated May 17, 2006
Responsive to Office Action of March 24, 2006

Claim 4 (original): The IGBT according to claim 1, wherein edge regions of the IGBT contain one or more emitter regions at said high-voltage edge.

)
Claim 5 (original): The IGBT according to claim 1, wherein said at least one emitter short regions is one of a plurality of emitter short regions.

Claim 6 (currently amended): The IGBT according to claim 5, wherein said at least one emitter region is integrated in contiguous fashion, and at least some of said emitter short regions are integrated in insular fashion.

Claim 7 (currently amended): The IGBT according to claim 6, wherein at least some of said emitter short regions are integrated strip-shaped emitter short regions.

Claim 8 (canceled)

)
Claim 9 (currently amended): The IGBT according to claim 7, wherein at least some of said emitter short regions are integrated annular strips.

Applic. No. 10/698,082
Response Dated May 17, 2006
Responsive to Office Action of March 24, 2006

Claim 10 (currently amended): The IGBT according to claim 6, wherein at least some of said emitter short regions are integrated punctiform regions.

)
Claim 11 (currently amended): The IGBT according to claim 10, wherein at least some of said emitter short regions form a ring of punctiform islands below said high-voltage edge.

Claim 12 (canceled)

Claim 13 (canceled)

Claim 14 (previously presented): The IGBT according to claim 1, wherein a lifetime of minority charge carriers in said semiconductor substrate is at least 10 μ s.

Claim 15 (previously presented): The IGBT according to claim 1, wherein a thickness of said inner zone formed by said substrate is less than 200 μ m.

Claim 16 (previously presented): The IGBT according to claim 1, which comprises a field stop region of the second conductivity type integrated between a first region including

Appl. No. 10/698,082
Response Dated May 17, 2006
Responsive to Office Action of March 24, 2006

said substrate and a second region including said emitter region and emitter short region.

) Claim 17 (previously presented): The IGBT according to claim 1, wherein said substrate forming said inner zone is weakly doped, and said emitter region is heavily doped with a significantly higher doping concentration than said inner zone.

Claim 18 (previously presented): The IGBT according to claim 1, wherein said at least one emitter region is annealed at a temperature of less than 600°C.

Claim 19 (previously presented): The IGBT according to claim 1, wherein the first conductivity type is the p-conductivity type and the second conductivity type is the n-conductivity type.

Claim 20 (canceled)

)